5000 separate memoirs have been examined page by page. The substances are arranged in alphabetical order, and are also indexed according to formulæ. The references are indicated by numbers which correspond to the index of authors given at the end of the volume.

The book is well printed on good paper, and is solidly bound in cloth. It is the only complete work on the subject, and will be a valuable addition to English standard books of reference.

J. B. C.

OUR BOOKSHELF.

Boilers, Economisers, and Superheaters: Their Heating Power and Efficiency. By Prof. R. H. Smith. Pp. viii + 128. (London: Crosby Lockwood and Son, 1915.) Price 7*s*. 6*d*. net.

THE author's purpose in this book is to provide material whereby the designer of steam boilers may take account of the transmission of heat by radiation from the incandescent fuel and the incandescent parts of the flame in as full and scientific a manner as the data at present available makes possible. It is assumed that combustion is completed within, or close to the surface, of the mass of coal, and that the heat so produced is divided between heating the solid coal and heating the generated gases. This assumption enables the furnace gas temperature to be calculated for various ratios of air actually admitted to the furnace to the air required by chemical theory, and for various heating values of the fuel. The result indicates that the temperature depends almost solely upon the air ratio, and to a minute degree only upon the heating value of the coal. The heat given up by the gases passing along the flues is then dealt with and similar calculations are given for economisers; applications to superheaters form the subject of a separate chapter. The laws of heat transmission in boilers are too complex for ready use in engineering drawing offices, and the author has reduced these laws to the form of diagrams. It is unfortunate that these diagrams, while showing the way in which the quantities involved vary, are reproduced to a scale too small to be read accurately; the reader interested in boiler design is invited to purchase copies of the original large-scale diagrams. There is a great deal of interesting and useful matter in the book, but it is not presented in a very readable form, and the practical designer is likely to consult the diagrams much more frequently than he will refer to the text.

Through the Grand Canyon from Wyoming to Mexico. By E. L. Kolb. Pp. xix + 344. (New York: The Macmillan Co; London: Macmillan and Co., Ltd., 1914.) Price 8*s*. 6*d*. net.

THIS is a graphic but unassuming account of one of the very few successful descents through the country of the Grand Canyon by boat from end to end. For European readers it should have contained a map, to ensure the appreciation of the vast distances involved and the remoteness from civilisation of the plateau-heights on either hand. Anyone who has travelled along gorges, such as the Bosnian canyon of the Vrbas, will realise the effect of a sudden contact with the outer world, where some trail descends by a gentler part of the valley-side, finds a passage across the river, and climbs again to the upper air. Such episodes, leading to the visiting of ranches where pioneers and outlaws still lead unhampered lives, broke the long series of hazards which the fearless author and his brother set before themselves. No two of the cataracts are alike, and the tale is so well told that the reader feels himself limited by rock-walls 4000 ft. in height; he sees the huge fallen blocks that seem to bar the passage, the spray rising from some swift descent ahead, the fierceness of which cannot yet be adequately gauged; he feels the whirl of the water round him in the rapids, where the boat twists like a porpoise in green waves; and at the end, among the sand-bars and marshes close to Needles, after a hundred-and-one days of travel, he takes leave of his guides with a genuine and affectionate regret.

The brothers Kolb are professional photographers, as the fine illustrations in this book so amply testify. The famous journey of J. W. Powell in 1869 is, of course, fully acknowledged, and references are given to Stanton, Galloway, Stone, and to the nameless trappers or prospectors who are known to us only by shattered boats or bleaching skeletons in the gorge. The geological study of the district has aptly influenced Mr. Kolb's descriptions, and seldom has a great adventure, carried out with skilled endurance, been told so simply and with so fine an absence of self-regard.

GRENVILLE A. J. COLE.

Pumping by Compressed Air. By E. M. Ivens. Pp. vi + 244. (New York: J. Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1914.) Price 12*s*. 6*d*. net.

IN compiling this book the author has had the advantage of being able to draw on considerable practical experience derived from installing and testing air lifts operating under a wide range of conditions. Very good and clear descriptions are given of various types of displacement pumps, return air systems, air lifts, and pumping systems generally. Of particular interest are the sections dealing with the air lift. In this system a long vertical pipe is led down the well, and has an open mouth near the bottom and under the water-level, so that normally the water stands at a considerable height inside the pipe. Compressed air is led down the well by a separate pipe, and is discharged through suitably shaped orifices into the first-mentioned pipe at a point well below normal water-level. The ascending bubbles of air cause an upward flow of water, which is finally discharged into a tank at or above ground-level. The theories of Harris and of Lorenz regarding the action in air lifts will be found in the book, together with much matter of practical interest. The practical treatment is good, and forms a

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useful addition to a subject the literature of which is not extensive.

In dealing with the more theoretical matters concerning the laws of expansion and compression of gases the author is not so fortunate, and there are a number of loose and careless statements. Thus on p. 160 we find Boyle's law stated as follows: At constant temperature the volume of gas is proportional to the absolute pressure. The author is not unaware of the fact that the volume is inversely proportional to the absolute pressure, but this and other similar careless statements of facts mar an otherwise good and useful volume, and call for a thorough revision for the second edition.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

Electrical Notation.

SIR JOSEPH LARMOR'S letter in NATURE of January 21 (p. 561) reminds me that I have long wished to protest against the misuse of alphabetical symbols to designate the names of units. The word *ohm*, for instance, ought not to be abbreviated to ω; and the apparently authoritative suggestion now made that other names shall be written in the same sort of unreadable and worrying shorthand is essentially, though not superficially, illiterate as well as utterly unmathematical.

The *naming* of units has been conspicuously useful; the consumption of much-needed and already overworked symbols as substitutes for names is a wasteful practice which should be resisted among physicists, and be only tolerated in microscopy for purely biological use.

OLIVER LODGE.

University of Birmingham, January 23.

Mendelism in the Seventeenth Century.

THE Mendelian revival of breeding has brought to light many interesting facts concerning the inheritance of coat-colour in rabbits. From the work of Hurst, Castle, Punnett, and others, it is now known that when the wild "grey" or "agouti" rabbit is mated with white, black, or "blue" specimens, the offspring produced all display the colour of their wild parent. Although this is doubtless well known at the present day, it is, I believe, not generally known that these facts had been ascertained by rabbit-fanciers in Holland in the seventeenth century, and were put on record by the illustrious Leeuwenhoek in 1683.

In a letter from Leeuwenhoek to the Royal Society, addressed to Sir Christopher Wren, and dated July 26, 1683, the following remarkable passage occurs:—

"Multi nostratium civium alunt cuniculos, cum ad voluptatem, tum ob lucrum: suntque hi cuniculi plerumque magni atque albi, auribus praelongis donati, quod pulchritudinis loco ducunt. Ut vero hi cuniculi in lucem edant pullos grisei sive cinerei coloris, qualis est sylvestrium, utque pro his possint verno tempore vendi, foemellae albae marem griseum ac sylvestrem ex tumulis arenarum petitum, ubi omnes grisei coloris sunt, sociant: atque tales masculos intense griseos committunt non tantum cum albis, sed & versicoloribus, nigris, caeruleis foemellis: Ex quibus tamen quicquid procreatur, colorem patris refert; ut nunquam etiam observatus sit ullus ex tali jugatione productus cuniculus, qui fuerit capillo albo, aut alio quam griseo. Praeterea tales nunquam attingunt magnitudinem matris, neque aures acquirunt praelongas, neque pro matris natura plane cicurantur ac mansuefiunt, sed retinent semper aliquid ferocioris ferinaeque naturae ac indolis."

The letter will be found in the so-called "Opera Omnia" of Leeuwenhoek (Lugd. Batav., 4 vols., 1722). Owing to the confusing arrangement and pagination in this work—which consists of a number of separate sections, published at different dates, each with its own pagination—it is not easy to give an exact reference to a particular passage. In the copy of the "Opera Omnia" which I have consulted, the letter occurs on p. 49 (first pagination) of vol i. ("Anatomia et Contemplationes"), under the title, "De generatione Ranarum," etc. The passage in question begins at the foot of the following p. 53.

I may add that the letter is not to be found in Samuel Hoole's English edition of Leeuwenhoek's "Select Works" (London, 2 vols., 1798, 1807). This translator expurgated all Leeuwenhoek's letters dealing with spermatozoa. He calls them "Disquisitions of a peculiar kind, which to many Readers might be offensive."

Feeling some doubt as to the colour or marking which "*versicolor*" is intended to denote, I compared the Latin letter with an English version which was published under the title, "*An Abstract of a Letter from* Mr. Anthony Leeuwenhoeck *of* Delft *about Generation by an* Animalcule *of the Male Seed*, etc.," in the *Philosophical Transactions* of the Royal Society, vol. xiii. (xii.), p. 347, 1683. Both Latin and English versions are translations from the Dutch: for Leeuwenhoek could write no language but his own. In the English version, which is somewhat differently worded from the Latin, the words "*versicoloribus, nigris, caeruleis*" are rendered "Blew, Black, and Pyed." "*Versicolor*" evidently denotes some kind of piebald marking; though it probably does not mean—as one might perhaps conclude—the modern "Dutch" pattern. This, Prof. Punnett tells me, is of comparatively recent introduction, and has superseded an earlier or "original Dutch" marking which "has less white and has practically dropped out of the fancy."

It is clear from Leeuwenhoek's words that the Dutch rabbit-fanciers had, as early as 1683, discovered that the offspring produced by mating wild "grey" buck rabbits with tame long-eared white, black, blue, or piebald does, are always exclusively grey in colour; and that they are sufficiently like the wild rabbit in other respects also for them to be marketable as such.

Leeuwenhoek's statement that the hybrids produced by crossing piebald with wild rabbits are invariably "grey" in colour—without any white—seems open to question. Recent experiments have not yet solved the problems of the inheritance of pied patterns in rabbits. Prof. Punnett, who has been studying the matter for some years, tells me that when wild rabbits are crossed with modern Dutch, "the F_1 animals may be, though rarely, completely self-coloured. Generally they have a little white. The amount of this varies, but never approaches the amount found in the Dutch."

The statement that the progeny of long-eared tame doe-rabbits and wild males never possess such long ears as their mothers, appears to have been confirmed by Castle. "He crossed the long-eared lop rabbit with ordinary short-eared individuals. F_1 had ears of intermediate length" (Bateson, "Mendel's Principles of Heredity," 1909, p. 251). I do not know of any confirmation or contradiction of Leeuwenhoek's final

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